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FAULT DETECTION IN A PHYSICAL SYSTEM**ABSTRACT**

5 A method for detecting a fault in a physical system uses a model of the physical system and calculates estimated dependent variables or conditions for the system using substantially only independent variables that are measured from the system using hardware redundancy or selected based on their better measurement reliability. An example of hardware redundancy is to measure an independent variable using two or more sensors rather than one. The estimated dependent variables are compared to the corresponding measured dependent variable conditions to calculate residuals, which are then analyzed using appropriate fault detection techniques. The method is especially effective relative to prior fault detection method when used to detect anomalies or unknown fault states of the system.